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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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SCHLUMBERGER-DOLL RESEARCH
36 OLD QUARRY ROAD
RIDGEFIELD, CT 06877-4108

EXAMINER	
KENNEDY, ADRIAN L	

ART UNIT	PAPER NUMBER
2121	

DATE MAILED: 10/18/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/538,961	MIROWSKI, PIOTR	
	Examiner	Art Unit	
	Adrian L. Kennedy	2121	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *14 June 2005*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-14* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-14* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *14 June 2005* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date *10/03/05*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

Examiner's Detailed Office Action

1. This Office Action is responsive to application **10/538,961**, filed **June 06, 2005**.

2. **Claims 1-14** have been examined.

Information Disclosure Statement

3. Applicant is respectfully reminded of the ongoing Duty to disclose 37 C.F.R. 1.56 all pertinent information and material pertaining to the patentability of applicant's claimed invention, by continuing to submit in a timely manner PTO-1449, Information Disclosure Statement (IDS) with the filing of applicant's application or thereafter.

Claim Objections

4. Claims 8 are objected to because of the following informalities: The word oilfield is incorrectly spelled "oilfiled" ion line of claim 8. Appropriate correction is required.

Claim Rejections - 35 USC § 101

5. 35 U.S.C. 101 reads as follows:

> Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title.

6. Claims 1-14 are rejected under 35 U.S.C 101 as being directed to nonstatutory subject matter. In particular claims 1-7 are considered to be directed to an apparatus and claims 8-14 are considered to be directed to a method, all in accordance with "The Interim Guidelines for Examination of Patent Applications for Patent Subject Matter Eligibility", Annex IV (a). It should be noted that the Guidelines provide a framework for the

rejection, but it is the case law cited therein that provides the legal authority for this rejection.

Claims 1-14 do not set forth a "useful, concrete and tangible result". In particular, it is not considered that these claims set forth a tangible result. Claims 1-14 do not produce a practical real world result. Claims 1-7 appear to be an apparatus which performs data manipulations but produces no real world output. Claims 8-14 appear to be nothing more than an abstract algorithm which is not statutory.

Claim Rejections - 35 USC § 102

7. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

8. Claims 1-4, 6, 8, 9-11 and 13 are rejected under 35 U.S.C. 102(e) as being anticipated by *West et al.* (USPN 6,438,493).

Regarding claim 1:

West et al. teaches

A system for inferring geological classes (C 1, L 10-12; "*characterizing and mapping seismic facies*") from oilfield well input data (C 1, L 10-12; "*seismic data*") comprising a

neural network (C 3, L 13-14; "*probabilistic neural network*") for inferring class probabilities (C 7, L 51-54; "*extract classification probabilities*"), characterized in that said system further comprises means for integrating class sequencing knowledge (C 3, L 61-63; "*seismic data is seismic attribute or amplitude data, including, but not limited to, near, far and full-stack data*"; C 3, L 64-65; "*at east one cross-section is selected*") and optimising said class probabilities according to said sequencing knowledge (C 8, L 24-37; The examiner takes the position that the process of improving result by varying the input data window is equivalent to applicant's claimed optimization process. Additionally, West et al. previously taught that the input data consisted of seismic attribute data including class sequence knowledge (full-stack data)).

Regarding claim 2:

West et al. teaches

The system wherein the means for integrating class sequencing knowledge and optimising said class probabilities according to said sequencing knowledge comprises a hidden Markov model.

The examiner takes the position that the use of a hidden Markov model is inherent in the invention of the West et al. This fact is evident in the fact that the in probabilistic pattern classification process (C 7, L 23-25; "*pattern classification*"), West et al. makes use of a Markov process (C 4, L 62-65; "*Markov Chain Analysis*") where the hidden states in the model are the lithofacies (C 7, L 25-28; "*unknown points*"), the observed state in the model is the input seismic data (C 7, L 25-28; "*known points*"), and the goal is to

determine the lithofacies that most likely to generated the seismic data (C 7, L 25-28; "*classification and prediction of unknown points*").

Regarding claim 3:

West et al. teaches

An automated system for inferring geological classes (C 1, L 10-12; "*characterizing and mapping seismic facies*") from oilfield well input data (C 1, L 10-12; "*seismic data*"), comprising a data input vector (C 7, L 7-10; "*input vector*"), a neural network trained to infer from said input vector a class sequence or class probability vector, and a modifier for correcting said class sequence or class probability vector using prior knowledge of class sequence or class probability (C 7, L 10-13; "*through training, the weights of the network are modified such that on a specific set of training examples, modification of the input attribute vectors produce a desirable outcome*"; The examiner takes the position that the use of a class sequence is anticipated by the use of seismic data (C 3, L 61-63; "*seismic data is seismic attribute*"), and the use of a class probability vector is anticipated by the use of classification probabilities (C 7, L 51-54; "*classification probabilities*")).

Regarding claim 4:

West et al. teaches

An automated system wherein the modifier (The examiner takes the position the modifier is the neural network) uses the prior knowledge of class probability distribution and class

transition probability (C 6, L 58-61; "*initial textural attributes*"; The examiner takes the position that by teaching that textural attributes inherently contain statistical information (C 5, L 41-43; "*statistical measures, called textural attributes*") related to seismic data, West et al. anticipates the use of class probability distribution. Additionally, by teaching that seismic data include stratigraphic information, West et al. anticipated the use of class transition probability information.).

Regarding claim 6:

West et al. teaches

An automated system wherein the modifier includes a Bayesian based probability calculator (C 7, L 22-23; "*probabilistic neural networks are parallel implementations of a standard Bayesian classifier*").

Regarding claim 8:

West et al. teaches

A method for inferring geological classes from oilfiled well input data, comprising the following steps:

inferring class probabilities (C 7, L 51-54; "*extract classification probabilities*") with a neural network (C 3, L 13-14; "*probabilistic neural network*");

and integrating class sequencing knowledge (C 3, L 61-63; "*seismic data is seismic attribute or amplitude data, including, but not limited to, near, far and full-stack data*"; C 3, L 64-65; "*at east one cross-section is selected*") and

optimising said class probabilities according to said sequencing knowledge (C 8, L 24-37; The examiner takes the position that the process of improving result by varying the input data window is equivalent to applicant's claimed optimization process. Additionally, West et al. previously taught that the input data consisted of seismic attribute data including class sequence knowledge (full-stack data)).

Regarding claim 9:

West et al. teaches

The method wherein the integrating class sequencing knowledge and optimising said class probabilities according to said sequencing knowledge is achieved according to a hidden Markov model.

The examiner takes the position that the use of a hidden Markov model is inherent in the invention of the West et al. This fact is evident in the fact that the in probabilistic pattern classification process (C 7, L 23-25; "*pattern classification*"), West et al. makes use of a Markov process (C 4, L 62-65; "*Markov Chain Analysis*") where the hidden states in the model are the lithofacies (C 7, L 25-28; "*unknown points*"), the observed state in the model is the input seismic data (C 7, L 25-28; "*known points*"), and the goal is to determine the lithofacies that most likely to generated the seismic data (C 7, L 25-28; "*classification and prediction of unknown points*").

Regarding claim 10:

West et al. teaches

A method for inferring geological classes from oilfield well input data, comprising the steps of

generating a data input (C 4, L 16-19; "*textural attributes*") based on said well input data (C 3, L 61-63; "*seismic data*");

using a neural network (C 3, L 13-14; "*probabilistic neural network*") to generate a class sequence (C 7, L 23-25; "*pattern classification*") or class probability vector inferred from said input; and

correcting said class sequence or class probability vector using prior knowledge of class sequence or class probability (C 7, L 10-13; "*through training, the weights of the network are modified such that on a specific set of training examples, modification of the input attribute vectors produce a desirable outcome*"; The examiner takes the position that the use of a class sequence is anticipated by the use of seismic data (C 3, L 61-63; "*seismic data is seismic attribute*"), and the use of a class probability vector is anticipated by the use of classification probabilities (C 7, L 51-54; "*classification probabilities*")).

Regarding claim 11:

West et al. teaches

The method wherein prior knowledge of class probability distribution and class transition probability is used to correct the class sequence or class probability vector (C 7, L 10-13; "*through training, the weights of the network are modified such that on a specific set of training examples, modification of the input attribute vectors produce a desirable*

outcome"; The examiner takes the position that the use of a class sequence is anticipated by the use of seismic data (C 3, L 61-63; "*seismic data is seismic attribute*"), and the use of a class probability vector is anticipated by the use of classification probabilities (C 7, L 51-54; "*classification probabilities*")).

Regarding claim 13:

West et al. teaches

The method wherein the correction includes a Bayesian based probability calculation (C 7, L 22-23; "*probabilistic neural networks are parallel implementations of a standard Bayesian classifier*").

Claim Rejections - 35 USC § 103

9. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

10. Claims 5, 7, 12 and 14 are rejected under 35 U.S.C. 103(a) as being unpatentable over *West et al.* (USPN 6,438,493) in view of *Doyle et al.* (USPN 5,504,479).

Regarding claim 5:

West et al. teaches the method of claim 4, but fails to teach the use of a Viterbi sequence. However, Doyle et al. does teach.

An automated system wherein the modifier includes a Viterbi sequence (C 13, L 62-64; "*Viterbi algorithm*"; The examiner takes the position that a Viterbi sequence is a sequence that has been generated with the use of the Viterbi algorithm).

It would have been obvious to one skilled in the art at the time of invention to combine the invention of West et al. with the invention of Doyle et al. for the purpose of determining the most likely sequence of hidden states that result in a sequence of observed states, and also for the purpose of *communicating signal from logging tools disposed in wellbores* (C 1, L 8-11).

Regarding claim 7:

West et al. teaches the method of claim 3, and the use of a Bayesian based probability calculation, but fails to teach the use of a Viterbi sequence.

However, Doyle et al. does teach.

An automated system wherein the modifier includes a Viterbi sequence (C 13, L 62-64; "*Viterbi algorithm*"; The examiner takes the position that a Viterbi sequence is a sequence that has been generated with the use of the Viterbi algorithm).

It would have been obvious to one skilled in the art at the time of invention to combine the invention of West et al. with the invention of Doyle et al. for the purpose of determining the most likely sequence of hidden states that result in a sequence of observed states, and also for the purpose of *communicating signal from logging tools disposed in wellbores* (C 1, L 8-11).

Regarding claim 12:

West et al. teaches the method of claim 10, but fails to teach the use of a Viterbi sequence.

However, Doyle et al. does teach.

An automated system wherein the modifier includes a Viterbi sequence (C 13, L 62-64; "*Viterbi algorithm*"; The examiner takes the position that a Viterbi sequence is a sequence that has been generated with the use of the Viterbi algorithm).

It would have been obvious to one skilled in the art at the time of invention to combine the invention of West et al. with the invention of Doyle et al. for the purpose of determining the most likely sequence of hidden states that result in a sequence of observed states, and also for the purpose of *communicating signal from logging tools disposed in wellbores* (C 1, L 8-11).

Regarding claim 14:

West et al. teaches the method of claim 10, and the use of a Bayesian based probability calculation, but fails to teach the use of a Viterbi sequence.

However, Doyle et al. does teach.

An automated system wherein the modifier includes a Viterbi sequence (C 13, L 62-64; "*Viterbi algorithm*"; The examiner takes the position that a Viterbi sequence is a sequence that has been generated with the use of the Viterbi algorithm).

It would have been obvious to one skilled in the art at the time of invention to combine the invention of West et al. with the invention of Doyle et al. for the purpose of

determining the most likely sequence of hidden states that result in a sequence of observed states, and also for the purpose of *communicating signal from logging tools disposed in wellbores* (C 1, L 8-11).

Conclusion

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. West et al. (USPN 6,560,540) is cited for his method for mapping seismic attributed using neural networks. Kim (USPN 6,442,487) is cited for his reliability measures for statistical prediction of geophysical and geological parameters in geophysical prospecting. Baggenstoss (USPN 6,466,908) is cited for system and method for training class specific hidden Markov model using a modified Baum-Welch algorithm. Anxionnaz et al. (USPN 7,062,072) is cited for his methods of producing images of underground formations surrounding a borehole. Nivlet et al. (USPN 6,847,895) is cited for his method for facilitating recognition of objects, notably geologic objects, by means of a discriminant analysis technique. Plona et al. (USPubN 200/0183930) is cited for his sonic well logging for characterizing earth formations. Cross et al. (USPubN 2002/0099504) is cited for his method of predicting three-dimensional stratigraphy using inverse optimization techniques. Mezzatesta et al (USPN 5,862,513) is cited for his systems and methods for forward modeling of well logging tool responses. Hoskins et al. (USPN 5,444,619) is cited for his system and method of predicting reservoir properties.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Adrian L. Kennedy whose telephone number is (571) 270-1505. The examiner can normally be reached on Mon -Fri 8:30am-5pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Anthony Knight can be reached on (571) 272-3687. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

ALK

Anthony Knight
Supervisory Patent Examiner
Technology Center 2100